

Common and Confusing Bipinnate-Dimidiate Adiantums of Tropical America

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Seven widespread neotropical species of *Adiantum* with bipinnate fronds and small, nearly oblong, dimidiate pinnules look superficially much the same and are commonly misidentified in herbaria. These species, *A. cajennense*, *fructuosum*, *fuliginosum*, *pulverulentum*, *serratodentatum*, *terminatum*, and *tetraphyllum*, can reliably be distinguished from one another on the basis of costa indument and abaxial lamina indument (observed at 50×) and often by frond and pinna morphology and rhizome morphology. However, pinna morphology is not always distinctive and is difficult to characterize adequately, and rhizome morphology is often not observable because collectors do not excavate and press the tenacious rhizomes. (In this regard, species with long-creeping rhizomes tend to have stipes that are straight at the base, whereas those with short-creeping rhizomes tend to have stipes that curve at the base, and so an educated guess about rhizome morphology sometimes can be made in the absence of the rhizome itself.)

Many of the species of *Adiantum* hybridize quite readily, which can lead to difficulty in making identifications. Kramer (1978, p. 95), for instance, suggested eight possible hybrids in Surinam, four of them involving one or two of the species treated here. If one has a clear concept of the species, the intermediateness of hybrids in pinna and pinnule shape is often evident, and at least one parent often can be deduced. According to Dr. Brigitte Zimmer (pers. comm.), many of the specimens that have passed as variants, such as pinnate or bipinnate "forms" of certain *Adiantum* species, are actually hybrids. Dr. Robbin Moran (pers. comm.) has begun to find a similar situation in the unrelated genus *Lindsaea* (Dennstaedtiaceae). It is interesting that both genera occupy similar, edaphically dry habitats, have evolved sufficiently similar habits to be mistaken for each other by non-pteridologists, and may grow in genus communities (Wagner & Wagner, 1983).

The following key will serve to distinguish these critical species of *Adiantum*. Although rhizome morphology is a useful character, I have avoided using it as a single character in the keys because of its frequent absence from herbarium sheets.

1. Abaxial surface of the laminae bearing simple, jointed hairs. Indument of the costae reddish brown, a mixture of simple, jointed hairs and linear scales up to 2(3) cells wide proximally and hair-like distally. Rhizomes short-creeping, knotted; stipes crowded.
2. Indusia brown (rarely blackish) at maturity, rarely any of them elongate, subtended by 2(4) veins.....1. *A. fuliginosum*

2. Indusia blackish at maturity (commonly brownish when young), usually some of them distinctly elongate, subtended by (2)3–4(6) veins.

2. *A. terminatum*

1. Abaxial surface of the laminae glabrous or bearing narrow scales, these sometimes bearing short teeth or dissected and resembling branched hairs.

3. False indusia 1 per pinnule, linear, usually more than 5 times longer than wide, borne along the acroscopic margin of the pinnule but never extending to the pinnule apex or distal margin. Abaxial surface of the pinnules bearing a few dissected scales resembling branched hairs. Rhizomes short-creeping, knotted; stipes crowded.

4. *A. pulverulentum*

3. False indusia 2–several per pinnule, elongate, mostly less than 4 times longer than wide, often on the distal margin and/or the pinnule apex, as well as the acroscopic margin of the pinnule.

4. Pinnules subtending the apical pinnule ca. 1/2 as long as the longest pinnules of the pinna; indument of the rachis and costae lax, pale (often whitish), linear scales a few cells wide at the base grading to dissected scales resembling branched hairs. Rhizomes long-creeping; stipes mostly 1–2 cm distant; abaxial surface of the pinnules bearing dissected scales, often glabrescent3. *A. serratodentatum*

4. Pinnules subtending the apical pinnule ca. 1/4 as long as the longest pinnules of the pinna; indument of the rachis and costae firm, tan to brownish, linear, subentire to toothed scales a few cells wide at the base, lacking dissected scales resembling branched hairs.

5. Scales of the axes at maturity appearing reddish-brown in mass at low magnifications, the larger ones linear, decidedly toothed, the smaller ones, when present, nearly entirely dissected into hair-like processes. Rhizomes long-creeping; stipes 1–2 cm distant; scales on the abaxial surface of the pinnules like those of the axes, the pinnules often glabrescent; false indusia 3–6 per pinnule.

5. *A. cajennense*

5. Scales of the axes at maturity appearing medium to dark brown in mass at low magnifications, all linear, scantily to decidedly toothed. Rhizomes short-creeping or long-creeping, stipes approximate or up to 1 cm distant.

6. Scales of the axes and on the abaxial surface of the pinnules linear, toothed only near the base; pinnules never falcate, the sterile apices always round; false indusia short, 5–10 per pinnule, pale at maturity. Rhizomes short-creeping, somewhat knotted, the rhizome scales decidedly bicolorous, their cells elongate, the lumina not obvious; stipes approximate.

6. *A. fructuosum*

6. Scales of the axes and on the abaxial surface of the pinnules linear, decidedly toothed, those of the pinnules often reduced

and resembling branched hairs; pinnules usually falcate, the sterile apices usually acute, sometimes round; false indusia definitely elongate, 4–7 per pinnule, blackish at maturity. Rhizomes long-creeping, not knotted (short-creeping, usually knotted in the Guianas and Brazil and rarely elsewhere), the rhizome scales concolorous, their cells relatively short, the lumina obvious; stipes up to 1 cm distant (approximate in the Guianas and Brazil).7. *A. tetraphyllum*

1. ***Adiantum fuliginosum*** Fée, Gen. Fil. 116. 1852.

Adiantum hirtum Splitg. Tijdschr. Natuurl. Gesch. Physiol. 7:428. 1840, nec Poir., 1810, nec Klotzsch, 1844.

Many collections of this species have been named *A. terminatum*, which is not surprising because no consistent characters of frond or pinnule shape separate the two species, although its fronds are generally larger and more robust than are those of *A. terminatum*.

This species is distributed in Surinam and Amazonian Brazil, with a few collections known from southeastern Brazil and from Venezuela to Amazonian Peru. It is not ascribed to the Lesser Antilles by Proctor (1977), and Mickel (1985) does not include it in the flora of Trinidad.

2. ***Adiantum terminatum*** Kunze ex Miq. Inst. Versl. Meded. Kon. Nederl. Inst. Wetensch. 1842:187. 1843.

Adiantum hirtum Klotzsch, Linnaea 18:553. 1844, nec Poir., 1810, nec Splitg., 1840.

Most of the material from Amazonian Brazil named *A. terminatum* is actually *A. fuliginosum*. See the comment under *A. fuliginosum*.

This species is known from Guatemala, Nicaragua, Costa Rica, Venezuela, Colombia to Bolivia, Guyana, Surinam, and Amazonian Brazil.

3. ***Adiantum serratodentatum*** Humb. & Bonpl. ex Willd. Sp. Pl. ed. 4, 5:445. 1810.

Especially in the central and northern states of Brazil, this species commonly hybridizes with *A. latifolium* Lam. The hybrids have relatively large subapical pinnules and many pairs of lateral pinnules like *A. serratodentatum* and elongate, oblong or triangular pinnules with acute apices more like those of *A. latifolium*. Axis indument is also intermediate between the parental species.

This species is known from Costa Rica to Bolivia, Trinidad, Venezuela, and the Guianas to southeastern Brazil and Paraguay.

4. ***Adiantum pulverulentum*** L. Sp. Pl. 2:1096. 1753.

Among the dimidiate species of *Adiantum*, this is most distinct because of its linear sori borne 1 per pinnule and always on the acroscopic edge of the pinnule. It is approached only by *A. villosum*, whose sori extend to the pinnule apex and continue on the distal margin of the pinnule and whose laminae are more like those of *A. latifolium* in pinnule size.

This species is known from throughout tropical America.

5. ***Adiantum cajennense*** Willdenow ex Klotzsch, *Linnaea* 18:552. 1844.

In pinna shape this species is very much like *A. fructuosum*, but it can be distinguished by its long-creeping rhizomes with distant stipes. The lateral pinnae of this species rarely exceed 15 cm, whereas those of *A. fructuosum* and *A. tetraphyllum* commonly do. The original spelling of the epithet, *cajennense*, is correct Latin, and there appears to be no reason to preserve the "corrected" spelling *cayennense*, which was adopted by most authors until recently.

This species is known from Colombia, Ecuador, and eastern Venezuela to the Guianas and central and northern Brazil.

6. ***Adiantum fructuosum*** Poepp. ex Spreng. *Syst. Veg.* ed. 16, 4:113. 1827.

Although this species has often been placed as a synonym of *A. tetraphyllum*, it is amply distinct, as shown by the key characters. The rhizome is quite like that of *A. tetraphyllum* from the Guianas and Brazil; the pinnae are like those of *A. cajennense* in their shape and smaller size.

This species is known from Cuba, southern Mexico, Guatemala, Costa Rica to Peru, Trinidad and Venezuela, and Brazil.

7. ***Adiantum tetraphyllum*** Humb. & Bonpl. ex Willd. *Sp. Pl.* ed. 4, 5:441. 1810.

The sterile pinnule apices of this species, at least in larger laminae, are acute and turn toward the pinna apex, whereas those of *A. fructuosum* are obtuse to round and do not turn toward the pinna apex. The pinnules themselves may be somewhat falcate in *A. tetraphyllum*, but in *A. fructuosum* they are not. The differences in rhizome morphology in the Guianas and Brazil do not correlate with any other characters.

This species is known from throughout tropical America.

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Announcement

Annual Review of Pteridological Research, Vol. 3 (for 1989), compiled by Cirri K. R. Moran and Robbin C. Moran, Missouri Botanical Garden, St. Louis. 72 pp. 1991. The ARPR provides researchers access to publications on pteridology for 1989, compiled lists of researcher's names, addresses, phone and FAX numbers, current research interests, and graduate student research projects. The 1989 volume contained 706 citations, research interests of 305 pteridologists from all parts of the world, including 107 students, and a mail/phone directory. The ARPR is now available as hardcopy or on disk. To purchase the 1989 ARPR or to subscribe to the 1990 ARPR now being compiled, send \$10.00 with your name and address to the International Association of Pteridologists, c/o Dean Whittier, Dept. Gen. Biology, Vanderbilt University, Nashville, TN 37235.